Forest Health Protection
Pacific Southwest Region

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To: Patricia Grantham, Forest Supervisor, Klamath National Forest

Subject: Biological Evaluation of the Jess Project Area, Salmon River Ranger District, Klamath National Forest (FHP Report No. N13-02)

At the request of Marissa Jones, Pete Angwin (Plant Pathologist) visited the Jess Project Area on the Salmon River Ranger District on May 9, 2012. Pete was joined by Marissa Jones (Forestry Technician), Roger Siemers (Silviculturist) of the Klamath National Forest, and Bill Jones (Contract Silviculturist). The project area is near the North Fork of the Salmon River and the town of Sawyers Bar. Two Project Area Units, 122 and 101, were visited. Bill Jones said that these Units were also representative of other Units in the Jess Project Area. The purpose of the visit was to assess insect and disease conditions and provide recommendations for the enhancement of forest health and stand resilience.

Background

While the Jess Project Area is not in a Late Successional Reserve (LSR), it is in an area that is proposed for critical northern spotted owl habitat. The purpose of the project is to improve the composition, structure and function of the forest ecosystem, provide resilience to fire and insect and disease attacks, reduce fire risk to nearby communities, and promote the economic stability of local communities. Ideally, the post-restoration forest would have a mixture of seral stages, providing a sustainable habitat for a diversity of terrestrial and aquatic species.

Observations

Unit 122

Unit 122 is approximately 80 acres in size, located at N41^{o} 40.773', W122^{o} 42.978'. Vegetation in the mixed conifer overstory and understory is dominated by Douglas-fir and lesser amounts of white fir, with scattered ponderosa pine, sugar pine and incense cedar (Figure 1). Counting the tree rings of the stump of a recently cut Douglas-fir indicated that the overstory is approximately 180-years old. A marked reduction in the size of the outermost 21 tree rings indicated recent growth reduction, most likely due to impacts of drought, disease and/or inter-tree competition (Figure 2).

Douglas-fir dwarf mistletoe (*Arceuthobium douglasii)*, as indicated by brooms in the branches, is widespread and common in the Unit. The infection level is high, with trees with a broom volume ratings (BVR) of 4-6 were common. Broom volume rating is a

modification of the Hawksworth 6-class dwarf mistletoe rating system, developed by Tinnin (1998). Under Tinnin's rating system, BVR classes range from 0 for non-infected

Figure 1. Vegetation at Jess Project Area, Unit 122.

Figure 2. Douglas-fir stump at Jess Project Area, Unit 122.

trees, to 6 for trees with at least 50% of the crown volume occupied by dwarf mistletoe brooms in each third of the live crown. White fir dwarf mistletoe (*Arceuthobium abietinum,* f. sp.*concoloris*) was also widespread in the white fir in the Unit. Although heavily infected white fir was not uncommon, with Hawksworth Dwarf Mistletoe ratings (DMRs) of 4-6, it did not appear to be quite as extreme as the dwarf mistletoe in the Douglas-fir. However, the dwarf mistletoes are undoubtedly contributing greatly to tree stress and mortality in the Unit, particularly during periods of drought.

An approximately 2-acre pocket of dead and dying Douglas-fir was noted in the Unit. Affected trees were heavily infected with Douglas-fir dwarf mistletoe. Close examination revealed no signs of black stain root disease or any other root disease, though galleries of a wood-boring beetle (most likely the flatheaded fir borer, *Melanophila drummondi*) were found. Some trees were streaming pitch high up in the bole, possibly due to the wood borer. The flatheaded fir borer typically attacks trees that are under stress, providing further indication that the trees had been greatly weakened by drought and dwarf mistletoe.

Unit 101

Unit 101 is located at N41^{o} 16.302', W123^{o} 10.119', and is a mixed conifer stand that consists of Douglas-fir, white fir, ponderosa pine and sugar pine in the overstory, with mostly Douglas-fir and white fir, and lesser amounts of ponderosa pine, sugar pine and incense cedar in the understory (Figure 3). Stocking in the Unit is very high. As in Unit 122, infection levels of dwarf mistletoe in both Douglas-fir and white fir are high, with many of the infected trees having DMRs or BVRs of 4-6. In addition, some of the incense cedar were infected with incense cedar true mistletoe, *Phorodendron juniperinum* spp. *libocedri*.

Figure 3. Vegetation at Jess Project Area, Unit 101.

Recommendations and Conclusions

It is obvious that the trees in the two units in the Jess Project Area are under a great deal of stress, due to the combined effects of high stocking and drought. The Douglas-fir and white fir in these Units are under added stress due to the impacts of the widespread and severe levels of their respective dwarf mistletoes, which is causing mortality in all sizes of these trees. While dwarf mistletoe is a natural component of many forest stands, and provides important nesting habitat for a wide variety of bird species (including the northern spotted owl), this level of the pathogen, which has been able to increase due to the effects of many years of fire suppression, is not. In addition, dwarf mistletoe seed is continually raining down onto the understory, perpetuating and accentuating the problem. Also, fire risk is high due to the mortality and brooms, creating fuels in all levels of the Units. Continued mortality may be expected in the most highly infected Douglas-fir. Mallams (2007) evaluated a series of permanent monitoring plots that were set up to monitor spread and impact of Douglas-fir dwarf mistletoe in similar mixed conifer stands in southwest Oregon and found that 45% of class 6 DMR/BVR-rated DF died in the 10-year monitoring period, and 11% of class 5 DF died. In addition to the direct effects of drought and dwarf mistletoe, the enhanced fuel levels could lead to the loss of the area by wildfire. This situation is not sustainable. Without active management, the Units will not be able to maintain old growth characteristics or wildlife habitat (including nesting habitat in the brooms of Douglas-fir), while the continued infection of younger understory Douglas-fir will limit the ability for them to grow into large old trees that will survive for many decades.

My recommendations for these Units, and for other similar Units in the Jess Project Area, are as follows:

- Thin to a wider spacing to increase species diversity and drought tolerance of the remaining trees. Favor non-dwarf mistletoe host species including ponderosa pine, sugar pine and incense cedar, then Douglas-fir and white fir

- Reduce dwarf mistletoe levels in the thin. Discriminate against Douglas-fir and white fir with DMR/BVRs greater than 2.0 and those with infections high in the crown. Smaller heavily infected understory DF and WF are very unlikely to reach large enough size to provide desired old growth and wildlife characteristics (Mallams, Goheen and Russell 2005; Mallams 2007), so discriminate against them as well. This treatment will involve the removal of many heavily-infected large overstory Douglas-fir and white fir to reduce the amount of dwarf mistletoe seed raining down onto the developing understory.

- Because the impacts of true mistletoe on its hosts are much less than those of dwarf mistletoes, and is spread by birds rather than by aerially-dispersed seeds to adjacent and overtopped trees, it is not necessary to discriminate against incense cedars that are infected with incense cedar true mistletoe.

- In areas where it is desirable to retain or maintain Douglas-fir dwarf mistletoe brooms for enhanced spotted owl nesting habitat, follow the recommendations of Marshall, Mamone and Barclay (2003), Mallams, Goheen and Russell (2005) and Mallams (2007) as follows:

    - Clump infected Douglas-fir together, surrounding the group with other non-host species (pine and incense cedar) to minimize lateral dwarf mistletoe spread. Manage for several clumps of infected Douglas-fir covering one-third to one-half of a 20-acre nest stand.

    - Manage current nest habitat to include one heavily-infected clump having at least one Type 2 or Type 3 broom and several lightly infected clumps. These will likely not survive well over the long haul (will die due to stress or fire), so manage for replacement nest trees as described in the next bullet statements. Note: Type 2 brooms are those that originate and are within a few feet of the bole and Type 3 brooms originate and are attached to the bole (Tinnin and Knutson 1985). These are the best kinds for nesting and cover.

    - Select infected clumps for replacement habitat that have infections in the lower third of the tree crown and Type 2 or 3 brooms wherever possible. Manage these clumps to keep infections in lower third as long as possible. This will create the least negative impact on tree vigor. Thinning around these trees can also help promote tree vigor and broom growth.

    - Favor infected areas that are on the lower to middle third of the slope to minimize the rate of DM spread from tree-to-tree through the stand.

Overall, the objectives of the treatments are to increase tree vigor and significantly reduce the incidence and impacts of dwarf mistletoe, while retaining sufficient numbers of nesting trees (with Type 2 and 3 Douglas-fir dwarf mistletoe brooms) for wildlife habitat in specific areas, and providing for the recruitment of new nest trees to replace ones that die. Post-treatment monitoring will be extremely important to track any

additional post-treatment mortality, increases or decreases in fuel levels, the release of retained trees, the status of existing nest trees and the recruitment of new nest trees, and to ensure that dwarf mistletoe growth is not faster than tree growth. This will not be a treatment that can simply be done and then ignored.

If you have any questions regarding this report or need additional information, please contact me at 530-226-2436.

/s/ Pete Angwin

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References

Mallams, K.M. 2007. Permanent plots for measuring spread and impact of Douglas-fir dwarf mistletoe in the southern Oregon Cascades, Pacific Northwest Region: results of the ten year remeasurement. USDA Forest Service Pacific Northwest Region, Southwest Forest Insect and Disease Service Center, Central Point, OR. SWOFIDSC-07-04. 33p.

Mallams, K.M., D.J. Goheen and D. Russell. 2005. Dwarf mistletoe broom development in mature Douglas-fir trees: a retrospective case study. Northwest Science 79(4): 281-288.

Marshall, K.M., M.M. Mamone and R.Barclay. A survey of Douglas-fir dwarf mistletoe brooms used for nests by northern spotted owls ion the Applegate Ranger District and Ashland Resource Area in southwest Oregon. Western Journal of Applied Forestry 18(2): 115-117.

Tinnin, R.O. 1998. An alternative to the six-class dwarf mistletoe rating system. Western Journal of Applied Forestry 13(2): 64-65.

Tinnen, R.O. and D.M. Knutson. 1985. How to identify brooms in Douglas-fir caused by dwarf mistletoe. USDA Forest Service Research Note PNW-426. Pacific Northwest Forest and Range Experiment Station, Portland, OR. 8p.